

Increasing Self-efficacy and Alleviating Anxiety using Touch Math and Instructional Games: An Intervention for Low Performing Seventh Graders

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Abstract— *The pre-experimental one-grouped pretest-posttest design was the researcher's way on providing a single group and intervention during the experiment. This study was limited to the mathematical anxiety, self-efficacy and mathematical performance of the 19 grade seven students of Telesforo and Natividad Alfonso High School for the school year 2016-2017.*

The coverage of this study was the third grading period geometry lesson and its main goal was to determine the problems that contribute to the mathematical anxiety and respondents' self-efficacy and its effect on their performance. Most especially, its major aim was to increase the students' self-efficacy and decrease their anxiety using touch math and instructional games strategies. As drawn from the results of the study, touch math on instruction and instructional games on assessment positively decreased students' mathematical anxiety, negatively increased their self-efficacy, and developed their academic performance. And it was suggested that different approaches such as cooperative learning, making topics practical and workable, and students' perceptions towards Mathematics should be taken into considerations in teaching Math to enhance their mathematical ability.

Keywords— *mathematical anxiety, self-efficacy, and mathematical performance.*

I. INTRODUCTION

The quality of students' academic performance is influenced by wide range of different factors rather simply teacher factors and psychological factors within the learners such as motivation and the self, rather than simply by ability. The test anxiety and Mathematics apprehension are increasingly being seen as factors underpinning levels of motivation for academic performance (Kumar & Karimi, 2010).

Similarly, Xu (2004) says that Mathematical anxiety is generally defined as a state of discomfort cause by performing math tasks. Mathematical anxiety can be manifested by feelings of anxiety, dislikes, tension, worry, frustration, and fear. It is known as a disabling condition when students struggle with mathematics. This is the real scenario why students avoid mathematics completely (Oxford & Vordick, 2006).

Mathematics anxiety is an outcome of low self-esteem (Daane, Judy, and Tina, 1986). This is also the idea of distress, fear and anxiety, or negative reactions toward interacting with others (Smith, Nelson, & Smeltzer 1994; McGuire, Stauble, Abbott, & Fisher, 1995; Beatty & Beatty, 1976).

On the other hand, as related to mathematical anxiety, Mathematics self-efficacy is commonly defined as individuals' beliefs or perceptions regarding their abilities in Mathematics on how they like to learn and the pace at which they learn.

According to Higbee and Thomas (1999), Mathematics self-efficacy influenced students' mathematical performances. The results of their study suggested instructors that focusing on teaching mathematical content are insufficient for some students to learn mathematics.

Mathematics self-efficacy is defined as the uniqueness and abilities of an individual to do organized, detailed and specific work. (Pastorino & Doyle-Portillo, 2013). Also, self-efficacy can be defined as the judgment of one's capabilities to successfully perform a particular given task (Zimmerman, 2000).

According to Margolis and McCabe (2006), self-efficacy is a belief of one's individual capacity to achieve his goal. Self-efficacious students can do difficult task and be intrinsically motivated. Also, they pointed how students

gain self-efficacy through mastery experiences, verbal persuasion and emotional state.

At the same time, Fenci and Scheel (2005) revealed that teachers should engaged different kinds of strategies in teaching in order to develop students' self-efficacy. Research shows that the type of learning environment and teaching method can improved self-efficacy in the classroom. (Bandura, 1991). A similar result has been reported by Franci and Scheel (2005) that teaching methods can be measured through classroom climate. In their study, it has showed that collaborative learning and inquiry-based activities has a great contribution to the students' self-efficacy development. Bandura also concludes in his work that cooperative learning strategy can improve students' self-efficacy and academic achievement.

Math anxiety and low self-efficacy create a big problem in the learning of mathematics and in creating mathematical students. As seen from the previous studies, Mathematics self-efficacy and Mathematics anxiety influence students' Mathematics achievement. Thus, it is important to understand how self-efficacy and anxiety relate to each other (May, 2009).

Apparently, students' beliefs about how worthwhile specific tasks are or how valuable the results of the tasks will be. If students will not see the importance of the subject, then he will not likely to love mathematics. Also, when students are faced with struggles or challenging tasks, they are not likely to persist if they do not feel that the task is worth the effort (Pintrich, 2004).

Fennema and Peterson (1983) have suggested that it is difficult to understand how to perceive usefulness affects achievement because achievement is affected by the student's locus of control.

As a whole, the researcher came to a realization in studying this Math anxiety and self- efficacy to gain knowledge and insights, since a low level of achievement in Math among students in the Philippines continues to grow (Talisayon, 2010).

With this, as a mathematics teacher, the researcher was inspired to learn as much as he could about the way in which students learn mathematics. Based from the personal experiences of the researcher at Telesforo and Natividad Alfonso High School, this decline in students Mathematics performance or failure to learn mathematics maybe related to inferior teaching methods and as a result there might be a need to understand the source of students poor performance of the study of mathematics and develop a method which is suited for the low performing seventh graders.

In this scenario, 30% or 15 of 50 students were incapable to solve basic operations and simple worded problems maybe because of the following reasons: poor study habit, low self-esteem, negative feelings in math, lack of interest due to the subject boredom, fear to fail, lack of exposure and self-confidence, and incompetence. Thus, this study will offer a group of grade seven students the opportunity to point out their experiences and feelings in their Mathematics subject.

This study carefully designed to guide a teacher and the students to a more exciting, interesting, and enjoyable days of teaching Math leading to its richer application in the real world.

Anent to the solution of this problem, touch math is a multisensory approach to teaching. Learners see the numerals, touch the touch points, say the numbers, and hear the problems as they say them aloud. Levels of representing knowledge - concrete, pictorial, and symbolic, as proposed by Bruner (1966), are also applied with touch Math. This approach to teaching computation connects the concrete level (manipulative) and symbolic level (abstract) concepts.

Dutton and Dutton (1991) proposed that teaching according to Bruner's theory of cognitive stages should involve moving from the concrete/ manipulative level, to the pictorial level, and eventually to the symbolic level. Grouwns (1992) offered that correctly using concrete materials could virtually eliminate mathematics anxiety.

Piaget (1975) proposed that people's development occurs in four stages: sensorimotor, preoperational, concrete operational, and formal operational.

The Touch Math program provides repetition of effective statements throughout the computation processes. When children learn these statements, they are able to make sense of the visual and hands-on experiences. The concrete operational stage is evidenced in children in grades one through six. These children can engage in logical thinking provided that the computation is accompanied by manipulatives. Using Touch Math, children can relate their classroom manipulatives to the Touch points on the numerals. This helps them to bridge the gap between the concrete manipulations and the symbolic representations. The formal operations stage is evidenced in learners from about age 12 and older. These learners can work both concrete (manipulative) situations as well as abstract (symbolic) problems. The Touch Math program facilitates this stage by slowly eliminating the use of the Touch points and moving to strictly symbolic notation.

Vygotsky (1962, 1967) theorized two concepts that relate to sociocultural development: scaffolding and the zone of proximal development. Teachers using the Touch Math program can teach children at their appropriate levels, thus promoting understanding of concepts and skills. The visual clues, Touch points, and effective computation statements provide students with just the right amount of instructional assistance they need to move them forward in their understanding. It is a waste of time to try to teach something that is far below or far above the child's zone of proximal development.

Gardner (1983, 1991, and 1993) proposed that people exhibit individual intelligence strengths. Willis (2001) described it as a movement away from a single IQ score, to a view of intelligence in many ways. Gardner's view of intelligence can be explained as eight frames of intelligence: bodily-kinesthetic, interpersonal, intrapersonal, linguistic, logical-mathematical, musical, naturalistic, and spatial. According to Willis, teachers can more effectively teach when they keep in mind children's intelligence strengths. The Touch Math program has built-in strategies to accommodate the various ways for children to access the content using their intelligence strengths. Other ways to use the program are suggested here to incorporate children's individual intelligence characteristics.

While instructional games, on the other hand, provides many response opportunities promoting mastery, automaticity (fluency), and/or skill maintenance. Game format motivates students.

Tom Schrand (2008) discusses the powerful capabilities of interactive multimedia games (or activities) where students work together as a class to categorize information in charts by moving facts so they rest in the appropriate labeled columns (p.81). Games that bring out these higher level thinking skills are becoming more popular, although more research and scientific assessment is necessary to measure their overall effectiveness since they are still relatively new. Regardless of the format of the game, students can simultaneously build their problem solving skills while having fun throughout the process if an instructional game is well-designed (MacKenty, 2006, Harris, 2009).

II. STATEMENT OF THE PROBLEM

This study aimed to determine the use of touch math method and instructional games to alleviate math anxiety and increase self-efficacy of low performing 19 grade seven students of Telesforo and Natividad Alfonso High School

for the School Year 2016-2017. Specifically, this study sought answers to the following questions:

1. What is the level of math anxiety and self-efficacy of the respondents before the use of touch math method and instructional games?
2. What is the pre-test and post-test results of the respondents?
3. Is there a significant difference between the pre-test and post-test results of the respondents?
4. What is the level of math anxiety and self-efficacy of the respondents after the use of touch math method and instructional games?
5. How may touch math and instructional games alleviate math anxiety and increase self-efficacy of the respondents?

Hypotheses

1. There is no significant difference between the pre-test and post-test results of the respondents.
2. The instructional games in alleviating math anxiety and increasing self-efficacy of the low performing grade seven students are not useful.

Scope and Limitations

This study was limited to the mathematical anxiety, self-efficacy and mathematical performance of the 19 grade seven students of Telesforo and Natividad Alfonso High School for the school year 2016-2017.

The coverage of this study was the third grading period lesson, which was geometry, and its main goal was to determine the problems that contributed to the mathematical anxiety and respondents' self-efficacy and its effect on their performance. Most especially, its major aim was to increase the students' self-efficacy and decrease their anxiety using touch math and instructional games strategies.

III. METHODS

This part described the research method and procedures employed in the study, locale of the study, respondents, research instruments and data gathering, and treatment of data used in the study.

Type of Research

The pre-experimental one-grouped pretest-posttest design was used in the study in order to determine the use of the given technique and to attain its objectives.

The pre-experimental one-grouped pretest-posttest design was the researcher's way on providing a single group and intervention during the experiment. This design does

not have control group. There was somewhat more structure, there was a single selected group under observation, with a careful measurement being done before applying the experimental treatment and then measuring after. This design has minimal internal validity, controlling only for selection of subject and experimental mortality. It has no external validity.

This method includes the use of pretest and post-test among the respondents. It was essential for the researcher to have knowledge about the nature of the local study thus, the pre-experimental one-grouped pretest-posttest design was considered as the relevant and applicable method to use.

Respondents and Sampling Method

The respondents of the study were the 19 low performing grade seven students of Telesforo and Natividad Alfonso High School for the School Year 2016 – 2017 (15 males and 4 females). The respondents were the low performers for the second grading period that got 79 below on their report card.

There was no control group in this study. The researcher used a purposive sampling in choosing the respondents of the research. The main purposes of this study were to determine the effectiveness of the two proposed strategies and to determine the changes on the anxiety and self-efficacy levels of the respondents with regards in the study of Mathematics.

Instruments

The primary instruments that were used for the gathering of data were the pre-test and post-test papers that were provided by the researcher adopted from the division level periodical examination. The test paper was a multiple-choice type of test. Also, the researcher provided different lessons using multimedia and different materials as guided from the module given by the Department of Education twisted with instructional games and touch math strategies. Lastly, the researcher used the survey questionnaire for determining the anxiety and self-efficacy level of the students with a total of 20-item, which was asked permission from the other researcher in using the said questionnaire.

Data Collection, Procedure, and Ethical Considerations

The following procedures were done to come up with the necessary data needed in this study: a) the researcher had asked permission from the Principal of

Telesforo and Natividad Alfonso High School to conduct her research; b) with the teacher's permission, the researcher entered the class and administered the questionnaires to the respondents; c) the researcher explained the purposes of the study and ensured the confidentiality of the responses, discussed briefly to the respondents how to answer the questionnaires and assisted them with their questions; d) after giving the survey questionnaire on anxiety, the researcher then administered the pre-test to the respondents giving them enough time to answer the examination; e) after collecting all the necessary data, the researcher analyzed and tabulated the data based on the objectives of the study; f) then, the researcher provided the instruction using instructional games on assessment and touch math on instruction throughout the third grading period; g) after the instruction, the researcher then again administered the survey-questionnaire and the post-test to the respondents in order to determine the changes on the level of the students' attitude towards mathematics; h) lastly, the researcher analyzed and tabulated the data based on the objectives of the study.

Confidentiality was maintained throughout the procedures by utilizing pseudonyms (e.g. Student 1, Student 2 ... Student 9) to de-identify the data. Also, the respondents do not even know that they were being studied in experimentation to avoid the changes on the data. Since the participants of the study were Grade 7 students, there was an emphasis on the ethical obligations to protect the rights of the respondents.

Data Analysis

The following statistical tools were used to analyze and interpret the quantitative data that were gathered from the study:

The **Mean formula** was used to determine the arithmetic average among the factors that contributed to the mathematical anxiety of the respondents and their performance.

T-test for Independent Samples was used to determine the significant difference between mathematical performance of the respondents before and after the instruction through pretest and posttest results.

Pearson-r was used in order to determine the correlational coefficient of the respondents' math anxiety level and self-efficacy using the data from the pre-test and post evaluation.

In order to determine the respondents' mathematical anxiety and self-efficacy, the Likert Scale will be adopted.

Numerical Rating Descriptive Rating

4.50 – 5.00	Always (A)
3.51 – 4.50	Very Often (VO)
2.51 – 3.50	Often (O)
1.51 – 2.50	Sometimes (S)
1.00 – 1.50	Never (N)

To interpret the computed r – value, the following scales were used:

± 1.0 -----	Perfect Correlation
$\pm 0.91 - 0.99$ -----	Very High Correlation
$\pm 0.71 - 0.90$ -----	Correlation
$\pm 0.51 - 0.70$ -----	Moderate Correlation
$\pm 0.31 - 0.50$ -----	Low Correlation
$\pm 0.01 - 0.30$ -----	Negligible Correlation
0.0 -----	No Correlation

The interpretation for the test results on mathematical performance will be organized, tabulated, and interpreted, (David, 2007):

Raw Scores	Descriptive Rating
39.50 – 50.00 -----	Excellent (E)
29.50 – 39.49 -----	Satisfactory (S)
19.50 – 29.49 -----	Good (G)
9.50 – 19.49 -----	Fair (Fa)
0 – 4.49 -----	Failed (F)

IV. RESULTS

This part presents the results, analysis, and interpretation of data gathered. The results were presented, analyzed, and interpreted to respond to the objectives of the study.

(i) Mathematical Anxiety and Self-efficacy of the Respondents before the Instruction

a. Mathematical Anxiety

The mathematical anxiety of the respondents was shown in table 1.1. The respondents' responses ranged from 3.32 (O) to 4.26 (VO). They were as follows:

I get tense when I prepare for Mathematics test ($M=3.63$, $SD=0.68$); I get nervous when I have to use Mathematics outside the school ($M=3.58$, $SD=0.69$); I worry that I will not be able to get a good grade in Mathematics subject ($M=4.26$, $SD=0.73$); I worry that I will not be able to do well on Mathematics tests ($M=4.00$, $SD=0.88$); I feel stressed when listening to Mathematics teacher in class ($M=3.32$, $SD=0.67$); I get nervous when asking questions in class ($M=3.79$, $SD=0.54$); Working on Mathematics homework is stressful for me ($M=3.42$, $SD=0.61$); I worry I will not be able to understand the Mathematics class ($M=4.05$, $SD=0.85$); I worry that I will not be able to get a “100” in my Mathematics subject ($M=3.58$, $SD=0.84$); and, I am afraid to give an incorrect answer during my Mathematics class ($M=3.89$, $SD=0.74$).

Based from the results, the top three highest means were the following: I worry that I will not be able to get a good grade in Mathematics subject ($M=4.26$, $SD=0.73$); I worry I will not be able to understand the Mathematics class ($M=4.05$, $SD=0.85$); I worry that I will not be able to do well on Mathematics tests ($M=4.00$, $SD=0.88$). No single item got a lower than 3.32 (O) which is the mean with 1 being the lowest and 5 being the highest response.

The grand mean of the respondents' responses was 3.75 with standard deviation of 0.23, which fell under the descriptive rating “Very Often”. This indicates that the students have high mathematical anxiety in their Mathematics subject.

Table.1.1: Mean Results of the Respondents on Mathematical Anxiety

No.	Items	Mean	SD	Description
1.	I get tense when I prepare for a Mathematics test	3.63	0.68	VO
2.	I get nervous when I have to use Mathematics outside of school	3.58	0.69	VO
3.	I worry that I will not be able to get a good grade in my mathematics subject	4.26	0.73	VO
4.	I worry that I will not be able to do well on Mathematics tests	4.00	0.88	VO
5.	I feel stressed when listening to Mathematics teacher in class	3.32	0.67	O

6.	I get nervous when asking questions in class	3.79	0.54	VO
7.	Working on Mathematics homework is stressful for me	3.42	0.61	O
8.	I worry that I will not be able to understand the Mathematics class	4.05	0.85	VO
9.	I worry that I will not be able to get a “100” in my Mathematics subject	3.58	0.84	VO
10.	I am afraid to give an incorrect answer during my Mathematics class.	3.89	0.74	VO
Grand Mean		3.75	0.23	Very Often

Legend:

SD – Standard Deviation

Numerical Rating Descriptive Rating

4.51 – 5.00 Always (A)

3.51 – 4.50 Very Often (VO)

2.51 – 3.50 Often (O)

1.51 – 2.50 Sometimes (S)

1.00 – 1.50 Never (N)

b. Self-efficacy

The self-efficacy responses of the respondents were shown of table 1.2. The results ranged from 1.79 (S) to 2.42 (S). They were as follows:

I feel confident enough to ask questions in my Mathematics class (M=2.05, SD=0.71); I believe I can do well on a Mathematics test (M=2.37, SD=0.90); I believe I can complete all of the assignments in a Math subject (M=2.21, SD=0.85); I believe I am a kind of person who is good in Mathematics (M=1.95, SD=0.71); I believe I will be able to use Math in my future career when needed

(M=2.42, SD=0.84); I believe I can understand the content in a Mathematics lesson (M=2.26, SD=0.87); I believe I can get a “100” when I am in a Mathematics subject (M=1.79, SD=0.71); I believe I can learn well in a Mathematics class (M=2.26, SD=0.93); I feel confident when taking a Mathematics test (M=2.21, SD=0.63); and, I feel confident when using Mathematics outside of school (M=2.42, SD=0.69).

Based from the findings the top three lowest means were the following: I believe I can get a “100” when I am in a Mathematics subject (M=1.79, SD=0.71); I believe I am a kind of person who is good in Mathematics (M=1.95, SD=0.71); and, I feel confident enough to ask questions in my Mathematics class (M=2.05, SD=0.71). No single item got a lower than 1.79 (S) which is the mean with 1 being the lowest and 5 being the highest response.

The grand mean of the respondents’ responses was 2.19 with standard deviation of 0.43, which fell under the descriptive rating “Sometimes”. This indicates that the students have low self-efficacy in their Mathematics subject.

Table.1.2: Mean Results of the Respondents on Self-efficacy

No.	Items	Mean	SD	Description
1.	I feel confident enough to ask questions in my Mathematics class	2.05	0.71	S
2.	I believe I can do well on a Mathematics test	2.37	0.90	S
3.	I believe I can complete all of the assignments in a Math course	2.21	0.85	S
4.	I believe I am the kind of person who is good in Mathematics	1.95	0.71	S
5.	I believe I will be able to use Math in my future career when needed	2.42	0.84	S
6.	I believe I can understand the content in a Mathematics lesson	2.26	0.87	S
7.	I believe I can get a “100” when I am in a Mathematics	1.79	0.71	S

subject				
8.	I believe I can learn well in a Mathematics class	2.26	0.93	S
9.	I feel confident when taking a Mathematics test	2.21	0.63	S
10.	I feel confident when using Mathematics outside of school	2.42	0.69	S
Grand Mean		2.19	0.43	Sometimes

Legend:

SD – Standard Deviation

Numerical Rating Descriptive Rating

4.51 – 5.00 Always (A)

3.51 – 4.50 Very Often (VO)

2.51 – 3.50 Often (O)

1.51 – 2.50 Sometimes (S)

1.00 – 1.50 Never (N)

(ii) **Difference Between The Pre-Test And Post-Test Results Of The Respondents**

Table 2 presents the difference between the pre-test and post-test results of the respondents. The mean score

of the respondents on their pre-test result was 21.28 with standard deviation of 4.08 and interpreted as Good (G). While, the mean post-test result was 36.67 with standard deviation of 4.65 and interpreted as Satisfactory (S).

Using t-test as an indicator the value obtained between the two variables was 3.92, which was respectively interpreted as significant. This simply means that there is a significant difference between the pre-test and post-test results of the respondents using touch mathematics and instructional games as an intervention used in the instruction.

Table.2: Difference between the Pre-test and Post-test Results of the Respondents

Variables	Mean	Standard Deviation	Descriptive Rating	Result	Remarks
Pre-test	21.28	4.08	Good (G)	3.92	Significant
Post-test	36.67	4.65	Satisfactory (S)		

Legend:

Level of Significance = 5%

Critical Value = 2.11

Indicator = T-test

Raw Scores Descriptive Rating

39.50 – 50.00 Excellent (E)

29.50 – 39.49 Satisfactory (S)

19.50 – 29.49 Good (G)

9.50 – 19.49 Fair (Fa)

0 – 4.49 Failed (F)

(iii) **Mathematical Anxiety and Self-efficacy of the Respondents after the Instruction**

a. *Mathematical Anxiety*

The mathematical anxiety of the respondents was shown in table 3.1. The respondents' responses ranged from 1.53 (S) to 2.00 (S). They were as follows:

I get tense when I prepare for Mathematics test (M=1.84, SD=0.69); I get nervous when I have to use Mathematics outside the school (M=1.79, SD=0.42); I worry that I will not be able to get a good grade in

Mathematics subject (M=2.00, SD=0.82); I worry that I will not be able to do well on Mathematics tests (M=1.89, SD=0.66); I feel stressed when listening to Mathematics teacher in class (M=1.53, SD=0.77); I get nervous when asking questions in class (M=1.84, SD=0.69); Working on Mathematics homework is stressful for me (M=1.79, SD=0.63); I worry I will not be able to understand the Mathematics class (M=2.00, SD=0.67); I worry that I will not be able to get a "100" in my Mathematics subject (M=1.89, SD=0.57); and, I am afraid to give an incorrect answer during my Mathematics class (M=1.79, SD=0.63).

Based from the results, the top four lowest means were the following: I feel stressed when listening to Mathematics teacher in class (M=1.53, SD=0.77); Working on Mathematics homework is stressful for me (M=1.79, SD=0.63); I am afraid to give an incorrect answer during my Mathematics class (M=1.79, SD=0.63); and, I get nervous when I have to use Mathematics outside the school (M=1.79, SD=0.42). No single item got a lower than 1.53 (S) which is the mean with 1 being the lowest and 5 being the highest response.

The grand mean of the respondents' responses was 1.84 with standard deviation of 0.26, which fell under the descriptive rating "Sometimes". This indicates that the

students switched to low from high mathematical anxiety in their Mathematics subject after the instruction.

Table.3.1: Mean Results of the Respondents on Mathematical Anxiety

No.	Items	Mean	SD	Description
1.	I get tense when I prepare for a Mathematics test	1.84	0.69	S
2.	I get nervous when I have to use Mathematics outside of school	1.79	0.42	S
3.	I worry that I will not be able to get a good grade in my mathematics subject	2.00	0.82	S
4.	I worry that I will not be able to do well on Mathematics tests	1.89	0.66	S
5.	I feel stressed when listening to Mathematics teacher in class	1.53	0.77	S
6.	I get nervous when asking questions in class	1.84	0.69	S
7.	Working on Mathematics homework is stressful for me	1.79	0.63	S
8.	I worry that I will not be able to understand the Mathematics class	2.00	0.67	S
9.	I worry that I will not be able to get a "100" in my Mathematics subject	1.89	0.57	S
10.	I am afraid to give an incorrect answer during my Mathematics class.	1.79	0.63	S
Grand Mean		1.84	0.26	Sometimes

Legend:

SD – Standard Deviation

Numerical Rating Descriptive Rating

4.51 – 5.00	Always (A)
3.51 – 4.50	Very Often (VO)
2.51 – 3.50	Often (O)
1.51 – 2.50	Sometimes (S)
1.0 – 1.50	Never (N)

b. Self-efficacy

The self-efficacy responses of the respondents were shown of table 3.2. The results ranged from 3.32 (O) to 4.05 (VO). They were as follows:

I feel confident enough to ask questions in my Mathematics class ($M=3.32$, $SD=0.67$); I believe I can do well on a Mathematics test ($M=3.84$, $SD=0.60$); I believe I can complete all of the assignments in a Math subject ($M=3.47$, $SD=0.77$); I believe I am a kind of person who is good in Mathematics ($M=4.05$, $SD=0.85$); I believe I will be able to use Math in my future career when needed ($M=4.05$, $SD=0.78$); I believe I can understand the content

in a Mathematics lesson ($M=3.95$, $SD=0.91$); I believe I can get a "100" when I am in a Mathematics subject ($M=3.47$, $SD=0.84$); I believe I can learn well in a Mathematics class ($M=3.58$, $SD=0.77$); I feel confident when taking a Mathematics test ($M=3.74$, $SD=0.93$); and, I feel confident when using Mathematics outside of school ($M=3.79$, $SD=0.71$).

Based from the findings the top three highest means were the following: I believe I am a kind of person who is good in Mathematics ($M=4.05$, $SD=0.85$); I believe I will be able to use Math in my future career when needed ($M=4.05$, $SD=0.78$); and, I believe I can understand the content in a Mathematics lesson ($M=3.95$, $SD=0.91$). No single item got a lower than 3.32 (O) which is the mean with 1 being the lowest and 5 being the highest response.

The grand mean of the respondents' responses was 3.73 with standard deviation of 0.45, which fell under the descriptive rating "Very Often". This indicates that the students have switched to high from low self-efficacy in their Mathematics subject after the instruction.

Table.3.2: Mean Results of the Respondents on Self-efficacy

No.	Items	Mean	SD	Description
1.	I feel confident enough to ask questions in my Mathematics class	3.32	0.67	O
2.	I believe I can do well on a Mathematics test	3.84	0.60	VO
3.	I believe I can complete all of the assignments in a Math course	3.47	0.77	O
4.	I believe I am the kind of person who is good in Mathematics	4.05	0.85	VO
5.	I believe I will be able to use Math in my future career when needed	4.05	0.78	VO
6.	I believe I can understand the content in a Mathematics lesson	3.95	0.91	VO
7.	I believe I can get a “100” when I am in a Mathematics subject	3.47	0.84	O
8.	I believe I can learn well in a Mathematics class	3.58	0.77	VO
9.	I feel confident when taking a Mathematics test	3.74	0.93	VO
10.	I feel confident when using Mathematics outside of school	3.79	0.71	VO
Grand Mean		3.73	0.45	Very Often

Legend:

SD – Standard Deviation

Numerical Rating Descriptive Rating

4.51 – 5.00 Always (A)

3.51 – 4.50 Very Often (VO)

2.51 – 3.50 Often (O)

1.51 – 2.50 Sometimes (S)

1.00 – 1.50 Never (N)

(iv) Effectiveness of Touch Math on Instruction and Instructional Games in Assessment in Alleviating Anxiety and Increasing Self-efficacy of the Respondents

Table 4 shows the result of the touch math on instruction and instructional games on assessment in alleviating anxiety and increasing self-efficacy of the 19 low performing grade seven students.

Based from the data analysis, from the pre-evaluation on mathematics anxiety with the mean of 3.75 and standard deviation of 0.23 and post evaluation of 1.84 mean and 0.26 standard deviation, using t-test as an indicator with a critical value of 2.10, the value obtained from the pre and post evaluation was 7.78 which was respectively, significant and positively negligible correlational.

Based from the data analysis, from the pre-evaluation on mathematics self-efficacy with the mean of 2.19 and standard deviation of 0.43 and post evaluation of 3.73 mean and 0.45 standard deviation, using t-test as an indicator with a critical value of 2.10, the value obtained from the pre and post evaluation was 6.65 which was respectively, significant and negatively negligible correlational.

Table.4: Effectiveness of Touch Math on Instruction and Instructional Games in Assessment in Alleviating Anxiety and Increasing Self-efficacy of the Respondents

Variables	Pre-evaluation	Post-evaluation	Result	Critical Value	Remarks	r - values
Anxiety	M = 3.75 SD=0.23	M = 1.84 SD=0.26	7.78	2.10	Significant	0.18
Self-efficacy	M = 2.19 SD=0.43	M = 3.73 SD=0.45	6.65	2.10	Significant	-0.11

Legend:

Level of Significance = 5%

To interpret the computed r – value, the following scales were used:

± 1.0 -----	Perfect Correlation
$\pm 0.91 - 0.99$ -----	Very High Correlation
$\pm 0.71 - 0.90$ -----	Correlation
$\pm 0.51 - 0.70$ -----	Moderate Correlation
$\pm 0.31 - 0.50$ -----	Low Correlation
$\pm 0.01 - 0.30$ -----	Negligible Correlation
0.0 -----	No Correlation

V. DISCUSSION

This study aimed to determine the use of touch math method and instructional games to alleviate math anxiety and increase self-efficacy of 19 low performing grade seven students of Telesforo and Natividad Alfonso High School for the School Year 2016-2017.

The mathematical anxiety before the instruction on the respondents ranged from 3.32 (O) to 4.26 (VO). Based from the results, the top three highest means were the following: I worry that I will not be able to get a good grade in Mathematics subject; I worry I will not be able to understand the Mathematics class; I worry that I will not be able to do well on Mathematics tests. No single item got a lower than 3.32 (O) which is the mean with 1 being the lowest and 5 being the highest response. The respondents' responses fell under the descriptive rating "Very Often". This indicates that the students have high mathematical anxiety in their Mathematics subject.

The self-efficacy responses of the respondents before the instruction ranged from 1.79 (S) to 2.42 (S). Based from the findings the top three lowest means were the following: I believe I can get a "100" when I am in a Mathematics subject; I believe I am a kind of person who is good in Mathematics; and, I feel confident enough to ask questions in my Mathematics class. No single item got a lower than 1.79 (S) which is the mean with 1 being the lowest and 5 being the highest response. The respondents' responses fell under the descriptive rating "Sometimes". This indicates that the students have low self-efficacy in their Mathematics subject.

Difference between the pre-test and post-test results of the respondents was interpreted as Good (G). While, the mean post-test result was interpreted as Satisfactory (S). Using t-test as an indicator the value obtained between the two variables was significant. This simply means that there is a significant difference between the pre-test and post-test results of the respondents using

touch mathematics and instructional games as an intervention used in the instruction.

On the other hand, the mathematical anxiety of the respondents after the instruction was ranged from 1.53 (S) to 2.00 (S). Based from the results, the top four lowest means were the following: I feel stressed when listening to Mathematics teacher in class; Working on Mathematics homework is stressful for me; I am afraid to give an incorrect answer during my Mathematics class; and, I get nervous when I have to use Mathematics outside the school. No single item got a lower than 1.53 (S) which is the mean with 1 being the lowest and 5 being the highest response. The respondents' responses was fell under the descriptive rating "Sometimes". This indicates that the students switched to low from high mathematical anxiety in their Mathematics subject after the instruction.

However, the self-efficacy responses of the respondents was ranged from 3.32 (O) to 4.05 (VO). Based from the findings the top three highest means were the following: I believe I am a kind of person who is good in Mathematics; I believe I will be able to use Math in my future career when needed; and, I believe I can understand the content in a Mathematics lesson. No single item got a lower than 3.32 (O) which is the mean with 1 being the lowest and 5 being the highest response. The respondents' responses was fell under the descriptive rating "Very Often". This indicates that the students have switched to high from low self-efficacy in their Mathematics subject after the instruction.

Finally, as it shows the result of the touch math on instruction and instructional games on assessment in alleviating anxiety and increasing self-efficacy of the 19 low performing grade seven students based from the data analysis, from the evaluation on mathematics anxiety using t-test as an indicator the result was significant and positively negligible correlational. And based from evaluation on mathematics self-efficacy using t-test as an indicator the result was also significant and negatively negligible correlational.

VI. CONCLUSION

As can be drawn from the results of the study, touch math on instruction and instructional games on assessment significantly positively negligibly decreased students mathematical anxiety, significantly negatively negligibly increased their self-efficacy, and developed their academic performance.

Recommendation

The results of this study provided information that could be practically applied in the Mathematics education setting. Based from the results, discussion, and conclusion, the obvious recommendation are hereby provided: a) different approaches such as cooperative learning, making topics practical and workable, and students' perceptions towards Mathematics should be taken into considerations in teaching Math to enhance their mathematical ability; b) teachers in Mathematics are encouraged to make their students get involved in various activities. Teachers could provide more encouragement to students to help expand their confidence; c) teachers could provide lower level students with hands-on activities and immediate feedback on classwork so that students see success from their effort. Classroom teachers could provide opportunities for students to build confidence through small steps of success; and, d) teachers or future researchers can consider a deep study regarding the profile of the respondents aside from using anxiety and self-efficacy.

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